Pollution Prevention Guidelines for Dental Offices

Handling Radiographic Developer and Fixer

Spent X-ray fixer contains silver at concentrations that classify it as hazardous waste

- Spent fixer is considered a hazardous waste when the silver concentration is 5 parts per million or greater.
- X-ray fixer should **not** be discharged into septic tanks or into the sanitary sewer **without** first recovering silver from the waste stream.

Do you know the best management practices & options for handling spent X-Ray fixer?

- Spent fixer should be collected and stored in a closed container appropriately labeled "**Spent Fixer - Hazardous**."
- Spent X-ray fixer can be recycled by a local recyclers or the supplier of X-ray materials.
- When your office accumulates 5 gallons of fixer, contact a recycler or supplier to arrange for pick up or a time for delivery from your office.
- If you are located next to other dental offices, the recycler can be contracted to pick up **all the offices spent fixer on a schedule.**
- If you recycle your spent fixer, your office should receive a manifest from the recycler. A generator is responsible from "**cradle to grave**." Make sure that your office has the proper documentation. ***Recycling usually carries the least amount of liability.*** *Please see the attached list of recyclers.*
- Silver recovery equipment can be purchased or leased. The two most widely used types of treatment systems are (1)metallic replacement cartridges (also called chemical recovery cartridges) and (2)electrolytic recovery units.
- Metallic Replacement Units (MRCs) use elemental iron in steel wool or iron particles to replace silver in fixer solution with elemental iron. The silver precipitates from the fixer solution as a sludge which can then be reclaimed by a recycler.
- Electrolytic units use electrical current to plate out metallic silver, which can be reclaimed and recycled**. Typically, electrolytic units do not reduce silver concentrations to levels that allow for disposal to the sewer system**. Electrolytic units require the addition of an MRC to reduce the silver concentration to less than 5 parts per million or less.
- Some offices build their own recovery systems. Homemade systems ***require***

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careful and stringent monitoring to ensure they are adequately removing silver to meet the ***City of Albuquerque's Sewer Use & Wastewater Control Ordinance***, and New Mexico's Hazardous Waste Regulations. **Contact the p2 Program for free analysis of treated X-Ray Fixer**.

- For more information on selecting a treatment unit or shipping regulations concerning recovered silver, please contact the City's p2 program. Attached is a list of silver recovery equipment suppliers.
- According to *KODAK Customer Imaging Environmental Support Services* (CIESS) the best way to clean up spent X-Ray fixer is to use an absorbent, or an absorbent sock, the absorbent or sock must then be treated as a hazardous waste.

Fixer and developer should never be mixed

- Fixer and developer should **not** be mixed **(mixing inhibits silver reclamation**).
- Some radiographic film processors automatically mix spent fixer and developer together. Usually, the fixer line can be adjusted to prevent mixing which will allow more efficient silver recovery.

There are fixer test kits available to help your office fully use fixer

- Ask your radiographic supplier if they carry silver test kits that determine if your treated fixer meets the sewer discharge limit. If your supplier does not carry the kits, they can be ordered from ***USI Environmental Reclamation Division 414-344-3000.***
- Please keep in mind that if treated fixer is higher than 5 mg/l it will not meet the ***City of Albuquerque Sewer Use & Wastewater Control Ordinance***. **To meet NM Hazardous Waste Regulations spent fixer must be below 5 mg/l**.
- ***New Mexico State Hazardous Waste Regulations*** require a **hazardous waste characterization** test, which is laboratory analysis of the concentration of metals, or other pollutants of the material in question.
- **Dental Offices can contact the Pollution Prevention Office at 873-7058 to test treated fixer free!** The analysis the City provides will allow your office to meet State and City Regulations.

Testing spent fixer's silver concentration will determine when preventive maintenance for silver recovery equipment is needed. Please see the example of a maintenance log for silver recovery.

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Example
Dental Office Silver Recovery Record Sheet

City Rep. Initials	Result of analysis by City	Date of analysis by City	Date	Code	Comments	Dental Office Initials
			3/12/99	M	Changed cartridges	DH
			4/23/99	S	Spilled fixer on floor while changing cartridge	JG
				P	**Diagnostic Imaging** picked up 5 gallons of photo fixer	JK
BLL	5.0 mg/l	6/12/99	5/10/99	T	5 parts per million of silver	DH

Code Key

M=System Maintenance
T=Silver Test
S = Spill
P=Pickup of Spent X-Ray Fixer Recycler
W=Waste Disposal

This example of record keeping can be used to track silver recovery system maintenance and problem areas.

By marking down specific information (i.e., rising silver concentrations, chemical spills, cleaning repairs, etc.), your office is meeting City and State requirements, and pinpointing potential areas that can affect proper silver recovery system operation. Please see the attached log at the end of these guidelines. You office can use the sheet to record information relating to silver recovery and recycling.

- To meet **NM Hazardous Waste Regulations for treating fixer, treated fixer from cartridges must be analyzed (Hazardous Waste Characterization Test) at least annually (during the calendar year) for silver. The City will provide analysis free. State Inspectors will check records to ensure that the cartridges have been monitored regularly**.
- If your office has a silver recovery system, the City suggests that silver recovery equipment be **monitored monthly or bimonthly**. The City's p2

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Program provides **free test strips to offices,** to determine if cartridges are exhausted and should be changed or rotated. If treated fixer is at 5 parts per million cartridges should be rotated and changed. **Call the City's p2 Office at 873-7058 for free test, or call for a free chemical analysis** of the treated fixer for silver.

- Your office can comply with NM Hazardous Waste Regulations by having a recycler pick up spent X-Ray Fixer.
- By noting the date of the last cartridge change, keeping records, you will meet local and state regulations.

There are environmentally safe cleaners for X-ray developer systems

- Check with your radiographic supplier to find developer system cleaners that do not contain **chromium.** Cleaners with chromium at or above 5 parts per million (mg/l) should be disposed of as a **hazardous waste** and should **not** be discharged to the sewer. Chromium concentrations in developer system cleaners can exceed ***City of Albuquerque Sewer Use Control Ordinance and NM Hazardous Waste Regulations.***
- Another option is to have a cleaning service maintain the X-ray unit and properly dispose of cleaning wastes.

X-ray film contains silver, which can be recycled

- X-ray film can be recycled. Some companies reclaim the silver on the film and the plastic film into reusable products. If film is not recycled a **hazardous waste characterization test** must be preformed, if the film has a silver concentration of 5 parts per million or exceeds 5 parts per million of silver it must be handled as hazardous waste. Attached is a list of companies that recycle X-ray film.

Developer can be poured down the drain

- If developer is not mixed with fixer and has a pH between 5.0 and 11.5, it can be poured down the drain. Check the *Material Safety Data Sheet* (MSDS) for the pH of the developer. Developers are usually alkaline.
- If your MSDS does not note the pH, it can be checked with pH test strips or a pH meter. Contact the **p2 Program to check the pH of your spent developer free!**
- If the pH is higher than 11.5 it can be adjusted with an acid, such as vinegar, to lower the pH to meet the Ordinance limit of 5.0 and 11.5.
- If the pH of spent developer is acidic, lower than 5.0, it can be adjusted using baking soda (sodium bicarbonate).
- Adjustment of pH should be done slowly, and carefully to avoid a reaction. Please contact the p2 Program at 873-7058 if your office needs assistance.

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Other Hazardous Materials: Silver Mercury, Lead Foil, & Organic Solvents

The release of mercury in the workplace & the environment can be reduced.

- Avoid rinsing amalgam down the sink, disposing of it in the trash, or discarding it as infectious waste.
- Amalgam may be a hazardous waste because of silver and mercury concentrations.
- Store scrap amalgam, including amalgam from traps, in a container filled with depleted fixer to **reduce the release of mercury vapor**. Please keep in mind, the spent fixer used to store waste amalgam should not be poured into metallic replacement cartridges, or into the container that spent fixer is collected in for recycling. The fixer may be contaminated with mercury. Once spent fixer has contact with waste amalgam, it should only be used for storage of waste amalgam.
- Traps or filters on evacuation systems should be replaced or cleaned regularly, but do not simply wash amalgam particles down the drain! The proper method is to retain all particles with other waste amalgam.
- Disposable traps and in-line filters can be disposed of as municipal solid waste if they are disinfected and visible pieces of waste are removed.
- Empty amalgam capsules can be discarded with municipal solid waste.
- Amalgam should not be disposed of in the trash or with infectious waste since it may end up in the landfill or incinerated.
- Recycling amalgam is better for the environment than disposal to a landfill or incinerator.
- Consult with the City's Pollution Prevention Program or the *American Dental Association* for information on recycling companies.

Equipment is available to keep fine amalgam particles from entering the sewer

Fine amalgam particles from tooth preparation or amalgam removal may pass through amalgam traps and filters and be released to the sewer. An amalgam separator connects to vacuum pump before sewer discharge. There are companies that sell or lease amalgam separators. These same companies will install, maintain, and recycle the captured amalgam. For more information on amalgam separation equipment, contact the p2 Program or refer to the list of vendors attached.

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Mercury Spills & Disposal

- Dental offices should have a written **Spill Control Plan** for mercury, amalgam, & chemical spills. Such a plan can be part of the required OSHA Spill Plan.
- Avoid storing amalgam near carpeting or rough areas that are difficult to clean.
- Spilled mercury may be picked up with trap bottles or tapes, or spill kits. Consult your dental supplier on commercial mercury spill kits available.

Local suppliers that carry Mercury Spill Kits

Mike Kelly Dental Supply	888-0825
Patterson Dental Supply Inc.	884-6757
Sullivan Dental Products Inc	856-3411
Safety-Kleen	884-2277

- The use of precapsulated amalgam will eliminate the possibility of a bulk mercury spill.
- Otherwise, bulk mercury should be stored in unbreakable containers on stable surfaces.
- Elemental mercury should **never** be poured down the sanitary sewer or put in the garbage.
- Waste mercury is a listed toxic hazardous waste.
- Mercury can be recycled or disposed of as a hazardous waste.
- If amalgam is recycled, the recycler should give your office a manifest. A generator is responsible from "**cradle to grave.**" ***Recycling usually carries the least amount of liability.***
- A list of recyclers of mercury is in the attached *Resource List.*
- If you have excess mercury, your office may want to contact other offices that may need bulk **mercury** and arrange to exchange the mercury.
- You can post surplus chemicals on a ***Materials Exchange Network.*** Materials Exchange Networks are information clearinghouses that identify and bring together waste generators and potential users. Material Exchange Networks promote the reuse and reclamation of materials and distribute information on the treatment and recovery of materials. Materials Exchange Networks usually publish catalogs and use webpages to promote exchanges. Please refer to *Resource List* for a list of exchange services.
- Mercury collected from spills should be treated as a hazardous waste.

Intraoral dental packets contain lead foil & may be hazardous

- Lead foil may be removed from used intraoral film packets and recycled by your film supplier or a metals recycler. A list of lead foil recyclers is attached.
- If lead foil is not recycled according to NM State Hazardous Waste regulations a hazardous waste characterization test must be done, if the

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intraoral packets test for lead at 5 parts per million or exceeds 5 parts per million of lead the material must be handled as a hazardous waste.

- Disposal of lead foil to the landfill is **not** recommended because lead leaching may classify this waste as hazardous.

Never pour flammable materials, including straight alcohol, ether, acetone, xylol, chloroform, or other solvents down the drain

- Flammable substances can cause explosions in the sewer system, injure workers, and damage plumbing. Contact the **Albuquerque Fire Department at 888-8124** for storage requirements.
- Chloroform is a listed waste (U044) and should always be handled as a hazardous waste.

Disposal of Spent Gluteraldehyde Solutions

Many hospitals, clinics and dental clinics use glutaraldehyde solutions at **2-4%** to disinfect surgical instruments. When solutions loose their ability to disinfect, they must be discarded.

- Cold sterilant solutions containing no more than four percent glutaraldehyde may be discharged to the City of Albuquerque's sanitary sewer system provided appropriate best management practices (BMPs) are followed.
- Disinfectant solutions **containing 2-4% glutaraldehyde** currently discharged to the sanitary sewer system have no detectable impact on the City of Albuquerque's treatment facilities. According to the Industrial Waste Engineer for the City of Albuquerque, the wastewater treatment plant has never had a "hit" for any such substance in the influent, and biomonitoring results are fairly consistent without indications of a "chronic" inhibitory effects from unknown chemicals.
- A literature review indicates that glutaraldehydes are readily biodegradable in secondary activated sludge treatment plants. Effluent toxicity is regularly monitored by fish bioassay. There is no NPDES permit limit or marine water quality criteria for glutaraldehyde.
- The biodegradation rates of glutaraldehyde indicate that only trace concentrations, if any, would be in the biosolids. Any trace concentration in the feed should biodegrade during aerobic and anaerobic digestion process. Currently there are no limits for glutaraldehyde in biosolids.
- Glutaraldehyde is highly soluble in water. Lower vapor pressure also reduces the likelihood that inhalation would be a substantial route of exposure. There are no OSHA requirements for worker protection
- Use only the quantity of gluteraldehyde necessary to do the job.
- Scrape wastes, especially amalgam residues, from instruments prior to sterilization
- Use autoclave to sterilize where possible (metal instruments)

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If your dental office is hooked up to a septic tank:

- There are special precautions with waste disposal to septic tanks. For assistance call the City's Pollution Prevention Program @ 873-7058 or 873-7059.

By adhering to these *Dental Waste Guidelines*, your dental office will comply with City and State Regulations.

The New Mexico District Dental Society has designated Safety-Kleen as their official Waste Handling Company.

The City of Albuquerque's p2 Program does not promote, recommend or endorse equipment, systems or manufacturers. Vendor information is furnished as a service to our clients.

X-Ray Fixer Log & Silver Recovery Record Sheet

City Rep. Initials	Result of analysis by City	Date of Analysis by City	Date	Code	Comments	Dental Office Initials

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